system at a first gas mixture flow rate and first oxidant:fuel ratio. Applicants respectfully disagree.

Referring to claim 1, Applicants last amendment made two principal changes. First, the amendment specified that the reformer system was operated at a first gas mixture flow rate and a first oxidant:fuel ratio, in order to provide a reference state against which the 'increasing' and 'controlling' steps in original claim 1 would be made. Second, the amendment changed "controlling" of the gas mixture flow rate to "reducing" the gas mixture flow rate.

With respect to the first change to claim 1, Applicants submit that it is inherent in the original disclosure and claim language that there is a reference state (i.e., a previous gas flow rate and oxidant:fuel ratio) against which the modified state of operation specified in claim 1 is made. If something is increased, it has to be increased over a previously-existing state. Additionally, the specification clearly discloses in paragraph [0025] on page 8 that "[o]nce the desired amounts of contaminants (e.g., carbon and the like) have been removed from the reformer at the elevated temperature, the reformer may *again* be operated at the peak flow rates . . . ." (emphasis added) Applicants respectfully submit that this unambiguous reference to a previous operation state clearly supports the amended claim language.

With respect to the second change to claim 1, Applicants point out that the concept of increasing the proportion of oxidant in the gas mixture *in conjunction with* controlling gas mixture flow rate was already clearly specified in claim 1. Controlling both of these parameters in conjunction with each other is also clearly disclosed in the specification in paragraph [0021] bridging pages 6 and 7 of the specification. Thus, the issue is really whether there is support in the specification for Applicants' changing the claim term "controlling" to "reducing". In this regard, the Examiner's

attention is respectfully directed to the sentence bridging pages 6 and 7 and the subsequent sentence

> A low oxidant flow rate, for example, is a rate of less than or equal to about 50% of a peak oxidant flow rate. Preferably, the oxidant flow rate is less than or equal to about 40% of the peak flow rate . . . .

Clearly, from this disclosure and other statements in paragraph [0021], the disclosed invention is intended to be practiced by reducing the oxidant flow rate compared to the prior oxidant flow rate. Applicants submit that in order to *reduce* the oxidant flow rate while *increasing* the proportion of oxidant in the gas flow mixture as originally specified in claim 1, the "controlling" step originally set forth in claim 1 inherently has to involve *reducing* the gas flow rate, as specified in the amended claim. As it is well-settled law that the written description requirement of 35 U.S.C. § 112 does not require the same words *verbatim*, but only that the disclosure show the inventors were in possession of the invention as claimed, Applicants respectfully submit that this requirement is clearly met in the present case, and they respectfully request that the rejection under 35 U.S.C. § 112, first paragraph, be withdrawn.

The Office Action rejects claims 1, 2, 4-8, 10-18, and 25-29 under 35 U.S.C. § 103(a) as unpatentable over Nataraj et al. This rejection is respectfully traversed.

Nataraj et al and Applicants are both concerned with the problem of carbon deposition in reformer reactors, but they approach it in significantly different ways. This is critical in assessing the unobviousness of Applicants' claimed invention. Applicants' invention is directed to *removing* carbon deposits after they have formed whereas Nataraj et al are focused on *preventing the formation* (col. 12, line 61) of carbon deposits in the first place. This may seem at first blush like an inconsequential difference, but is quite important when viewed in the context of Applicants' claimed invention, as discussed below.

The Nataraj et al reference discloses three reactions at col. 12, lines 44-45 as causing the formation of carbon deposits, focusing primarily on the cracking reaction (9)(col.12, lines 44-59). Nataraj et al disclose that the cracking reaction is favored by high temperatures and occurs on hot metallic surfaces, nickel catalyst sites, and acidic sites on refractory materials. The reference teaches that the formation of carbon deposits can be inhibited by chemical kinetics (e.g., the presence of hydrogen or steam, see col. 12, lines 60-61), but focuses most of its attention on avoiding carbon formation and the concomitant problem of 'metal dusting' by keeping the critical surface temperatures in the reactor below 427°C (col. 13, lines 17-37). The reference also states that promotion of the desired hydrogen-forming reactions in the reactor inhibits the carbon-forming cracking reaction (9) (col. 12, line 67-col. 13, line 4), and seems to imply that the *gradual* permeation of oxygen through the membrane of the Nataraj et al invention favors such reaction kinetics (col. 13, lines 4-7, emphasis added). There is no disclosure or suggestion in the Nataraj et al reference of Applicant's approach of reducing the oxidant flow rate in order to address the problem of carbon deposits. Nataraj et al's reference to gradual permeation of oxygen relates not to flow rate, but to a kinetic profile in the reactor along their claimed membrane through with oxygen enters the reactor.

Applicants' invention, on the other hand, is directed toward a method of removing carbon deposits after they have formed. This is accomplished by temporarily changing the performance parameters to an increased oxidant:fuel ratio in conjunction with a reduced gas mixture flow rate after having operated the reformer at a first ratio and flow rate. This allows the reactor to temporarily operate under a low oxidant high temperature condition that is favorable to oxidizing and removing the previously-formed carbon deposits.

Because of it's different approach to addressing the problem of carbon formation in reformer reactors, the Nataraj et al reference does not disclose or suggest operating the reactor at a second oxidant:fuel ratio and gas flow rate *after* having operated at a first ratio and gas flow rate. Instead, Nataraj focuses on achieving a steady state operating profile that inhibits the formation of carbon deposits by *avoiding high temperatures* and promoting the formation of hydrogen. There is no disclosure or suggestion in the Nataraj et al reference of increasing the oxidant:fuel ratio at which the reformer is operating, in conjunction with reducing the gas flow rate, which Applicants teach *produces high temperatures* under conditions favorable for oxidation and removal of previously-formed carbon deposits. Applicants respectfully submit that any contrary reading of the Nataraj et al reference can only be made through the use of impermissible hindsight reasoning after having seen Applicants' invention.

For these reasons, Applicants respectfully submit that the rejection of claims 1, 2, 4-8, 10-18, and 25-29 under 35 U.S.C. § 103(a) as unpatentable over Nataraj et al should be withdrawn. As the claims are otherwise in condition for allowance, Applicants request early action toward that end.

USSN 10/178,133

Please charge any necessary fee and any additional necessary fees, including any extension of time, or any other fee deficiencies to Delphi Technologies, Inc., Deposit Account No. 50-0831.

Respectfully Submitted:

Paul L. Marshall, Attorney
Registration No: 31,178
Telephone: 248-813-1240

PLM:lt